Engine Management and Tracking System

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Extensive experience in software development and turbine engine management enabled Institute engineers to develop a secure web-based system to track parts life and configuration information of engines and components to support end-to-end management processes. This engine management and tracking system allocates times/cycles of each tracked part in an engine based on information downloaded from a jet after flight. The remaining useful life of a single part is tracked based on a predetermined limit for usage and the actual time the item has been in service.

The system was designed to maintain a valid configuration of components installed in an engine to ensure accumulated times are properly applied to each part. It can be configured to support changes in the numbers or types of parts on the engine without having to install a new version of the application. Reports provide the current state of the engine, as well as help determine when a part will need to be replaced based on present usage estimates.

Features

Time Change Interval Tracking – Client-approved time-change intervals are preinstalled for all applicable tracked parts for a specific engine configuration. As time-change intervals are modified or added, users may edit data to keep the system current with engineering directives.

Inspection Tracking – Users can create, modify and delete inspections at the serial number level. A simple, intuitive interface allows users to record compliance with inspections while maintaining the details within the serial number history and providing easy access through a variety of reports.

Time Compliant Technical Order (TCTO)/Service Bulletin (SB) Tracking – The system allows TCTO tracking at the serial number level. Users may create new TCTOs, including relevant data such as dates and other information, allowing for TCTO compliance confirmation.

Importing Engine Configurations – The tracking application allows users to import configurations in two ways. Files typically produced by the engine manufacturer during engine production contain engine/part configurations, typically with zero times on the

parts. Rigorous checks are performed against the approved engine configuration before these parts are imported into the system. The data in the files can be corrected from within the application. Extensive user feedback is provided to specify what changes must be made to the data before it may be imported. For those running standalone configurations of the software, send and receive functions allow users to export and import engine, assembly or part data from one database to another, complete with engine history and compliance information.

Part History – The history of each tracked part in the system is retained, including installations and removals, inspections, TCTO compliance, part number changes, part shipments and engine status changes. All data is recorded in the system and can be retrieved through a variety of reports. Most history records in the system capture the times/cycles of the part, and/or its next higher assembly time/cycles at the time the maintenance action took place.

Forecasting

Reports provide insight into upcoming inspections and time-change events. The Time Change and Inspection Forecast Report allows users to forecast engine on-time hours per day and retrieve a schedule of inspections and parts changes of when the specific work will be required. The Inventory Life Remaining by Serial Number Report identifies the expected engine on-time hours remaining for tracked parts, based on real-world damage accumulation.

Flexibility

The tracking software simplifies the process of changing part numbers and creating new configurations. Users log into the system and alter an existing configuration by adding or modifying the work unit code structure, add or replace approved parts, and adjust the quantity per assembly.

The flexibility of the system extends to aircraft types as well. Often, a single engine variant may be installed in more than one variety of aircraft. Out of the box, users can define new aircraft types, assign a number of engines for the new type and create aircraft serial numbers.

The application utilizes common codes for many part installation and removal actions, including:
- How Malfunctioned (HOWMAL)
- TCTO Types
- TCTO Status Codes
- Engine Status Codes
- Work Unit Codes (WUC)

These may all be edited after the system has been fielded. This allows for customization without expensive software changes, retesting and redistribution.

To support organizations with multi-engine environments, the software tracks multiple engine variants in one database. Parts may be assigned to one or more engine variants within an engine family so one database can track multiple engine types. Engine types can be restricted to installation on certain airframes to support a multi-engine, multi-aircraft environment.

Engine tracking reports can be exported in a variety of formats, including PDF, Word®, Excel® or comma separated value formats. Users can employ these options when supporting requests by other users or to create their own views of the information.

Software Environment

The engine management and tracking system is a web-based system with a small installation footprint. The general software environment recommendations include Microsoft Windows Server® environments and SQL Server®. However, existing customers also successfully run the system on laptops and computers utilizing Microsoft XP® and SQL Server Express Edition. Client computers running IIS can access the application without the need to install additional components. The system supports deployment of the database and presentation components to different tiers.

The web-based, Institute-developed engine management and tracking system, created for a large turbine manufacturer, was customized to their specifications. It tracks jet engine parts life and configuration information for detailed reports on the current state of their engine.

U.S. Air Force photo\Senior Airman Julianne Showalter

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